

Claims

We claim:

- 1 1. A method for quantizing an input signal including N samples into a
2 string of k symbols selected from a q -ary alphabet, comprising:
3 selecting an $[N, k]_q$ linear block error-correcting code having a
4 sparse factor graph representation;
5 determining a cost function for the input signal using a selected
6 mapping function from the symbols to the samples and a
7 predetermined distortion measure; and
8 decoding the cost function to an information block corresponding
9 to a code word of the linear block error-correcting code, the
10 code word having a low distortion cost, and the information
11 block including the string of k symbols.

- 1 2. The method of claim 1, in which the code is an $[N, k]_q$ sparse
2 generator factor graph code.

- 1 3. The method of claim 1, in which the code is a low-density generator
2 matrix code.

- 1 4. The method of claim 1, in which the decoder is a soft-input decoding
2 method.

- 1 5. The method of claim 1, in which the decoder is a belief propagation
2 decoding method.

- 1 6. The method of claim 1, wherein the decoder is a bit-flipping decoding
2 method.

- 1 7. The method of claim 1, further comprising a method for reproducing a
2 minimally distorted version of the input signal from the string of k
3 symbols, comprising:
4 encoding the string of k symbols into a reproduced code word
5 of the code; and
6 replacing symbols of the reproduced code word with samples
7 according to the selected mapping function.

- 1 8. The method of claim 7, in which the encoding method is the belief
2 propagation with hard messages for the sparse factor generator graph
3 representing the code.